9

THE RELATIONSHIPS OF THE LATROBE SEAM AT YALLOURN

By F. C. Beavis

[Read 11 December 1958]

Abstract

Detailed surveys during the investigation and construction of the extensions to the Yallourn Power Station yielded data concerning the hitherto little known relationships of the Latrobe Seam of brown coal in this area. The Latrobe Seam and associated sediments are in part equivalent to the Morwell Group, and pass conformably up into the clays and brown coal of the Yallourn Group. The coal of the Tanjil coal-field is continuous with the Latrobe Seam.

Structural studies showed that the Yallourn Monocline persists as a fold, and does not pass into a fault as suggested by earlier workers. No evidence of any movement of younger than pre-Jurassic age has been found along the Haunted Hill Fault.

Introduction

Detailed geological surveys during the investigations for the extensions to the Yallourn Power Station and the Latrobe Cooling Water Dam, and later, during the construction of the Yallourn "D" Power Station, provided data which have permitted resolution of some outstanding problems in this little known section of the Latrobe Valley Coal-field. The thick cover of Haunted Hill Gravel has made earlier work difficult. The exposures in tunnels and foundation excavations, as well as the very close boring, have enabled the writer to carry out detailed mapping as a basis for stratigraphic and structural studies.

The brown coal of the Yallourn Power Station was considered by Herman (1922) to be an extension of the Yallourn Seam, faulted against the Jurassic felspathic sandstones which outcrop nearby in the Latrobe R. Thomas and Baragwanath (1949) considered the relationships of the Latrobe Seam, with which the coal of the Power Station had been correlated, to be a matter for conjecture. These workers indicated that the Haunted Hill Fault formed the W. margin of the Latrobe Seam. Gloe (1956) has shown, in a detailed study of the N. margin of the Latrobe Valley Coal Measures, that the Latrobe Seam extends for many miles to the E. The present study has been restricted to the section between the Latrobe R. gorge and the Yallourn North Open Cut.

Geology

Stratigraphic Relationships of the Latrobe Seam

Intimately associated with the Latrobe Seam is an underlying ligneous clay, and an overlying sequence of sands, clays, and thin brown coals. No justification could be found for regarding these as distinct stratigraphic units, and for the purposes of the present discussion are regarded as being part of the Latrobe Seam, *sensu lato*.

North of the Yallourn North Open Cut, sediments of the Jurassic Tyers Formation outcrop, and further N. are overlain by basalts possibly to be correlated with the Thorpdale Volcanics. At the Open Cut it is known, chiefly as the result of boring, that the Latrobe Seam overlies the Tyers Formation disconformably, but without angular unconformity. Because of the absence of outcrops, and the lack of bores in critical sections, the relationship of the Latrobe Seam to the Yallourn Group is obscure in this area.

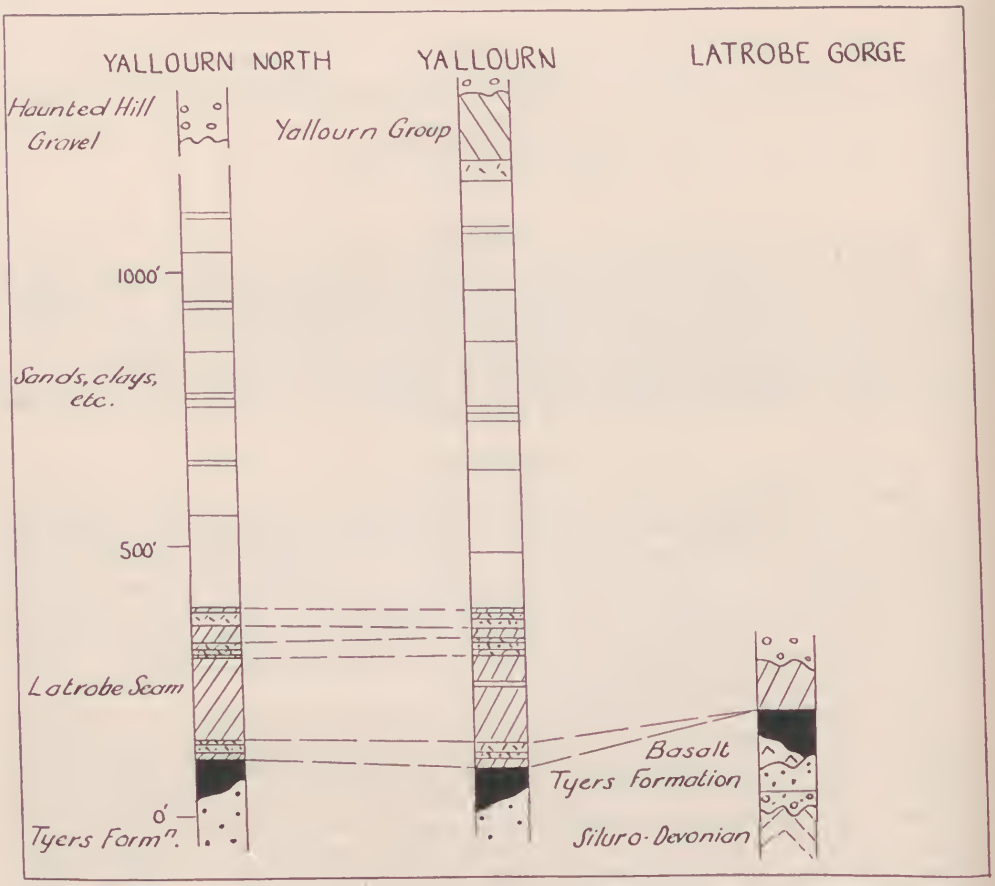

Fig. 1.—Stratigraphic sections, Yallourn Area. Thin black lines in columns represent coal seams.

At the Yallourn Power Station, the sequence mapped confirms correlation of these beds with the Latrobe Seam (Fig. 1). The boundary between the Tyers Formation and the Latrobe Seam here has been directly observed in the tunnels of the power station cooling water system. As at Yallourn North, the boundary is marked by a disconformity, with no evidence of the faulted relationship suggested by Herman (op. cit.). The relationship of the Latrobe Seam and the associated sediments to the younger Yallourn Group has not been directly observed, but the available evidence suggests a conformable passage between the two. Such a conclusion implies that the greater part of the Latrobe Seam and overlying sands, clays, and coals are equivalent to the Morwell Group. That the thick coals of the Morwell Group split, and are reduced in thickness between Morwell and Yallourn is known from recent boring.

Beds of the Latrobe Seam, dipping 45° SE., have been observed in the slot bunker excavations, within 150 ft., stratigraphically, of the Yallourn Seam. It is known both from boring and early excavation records that the dip of the base of

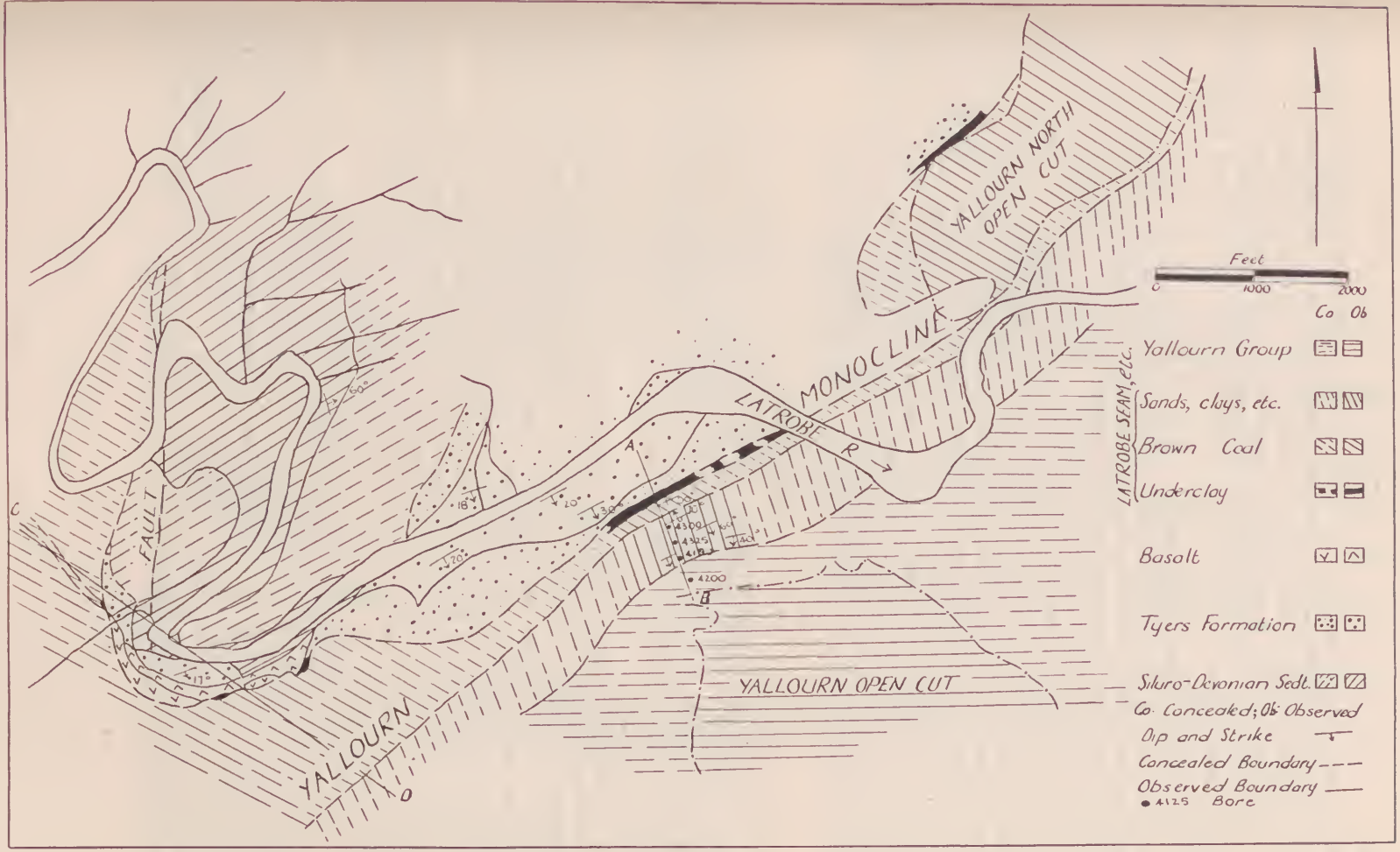

FIG. 2.—Geological map, Yallourn Area.

the Yallourn Seam here is 30° SE., which is close to that in the highest observed beds of the Latrobe Seam. Boring between the two exposures studied gives no indication of any structural or stratigraphic discontinuity (Section AB, Fig. 3).

The alternative to the conformable sequence is to postulate faulting. Parallelism of the regional strikes, and the form of the mapped boundary tends to exclude this possibility. However, a certain amount of bedding plane slip, indicated by slickensides, has occurred.

Between the Power Station and the Gorge on the Latrobe R., Siluro-Devonian sediments outcrop. These are overlain, with strong angular unconformity, by a thin conglomerate which marks the base of the Tyers Formation. The conglomerate, which outcrops near the pumping station, passes up into the felspathic sandstones and thin shales typical of the Tyers Formation elsewhere in this district (Philip 1958). The Tyers Formation is overlain in part directly by the clays and coals of the Tanjil Coal-field, and in part by basalt. The former is best seen in the tributary to the Latrobe R. at the pumping station, and the latter in nearby cuttings on the Moe-Yallourn railway line. On the basalt, an erosion surface of moderate relief has been developed, and on this surface, ligneous clay and brown coal have been deposited. The relationships of the coals to the Tyers Formation are similar to those already described in other sections and, while continuity of these clays and coals with those of the Power Station has not been observed, the bores in this area strongly suggest that such continuity exists. Correlation of the clays and brown coals of the Tanjil field with the Latrobe Seam would therefore appear to be justified.

Structure

The structure of the area under review is dominated by the Yallourn Monocline, which, contrary to the views of Thomas and Baragwanath (op. cit.), maintains its identity as a fold, and does not pass into a fault. Overturning of the beds of the Latrobe Seam has occurred along the monocline as well as marked thinning. No displacement due to faulting has been observed, but bedding plane slip is certain to have occurred.

The maps of Thomas and Baragwanath (op. cit.) show the Yallourn Monocline terminating to the W. on the Haunted Hill Fault. Physiographic evidence of the Haunted Hill Fault is lacking, and a study of the Haunted Hill suggests that the escarpment which forms the E. margin of the Hill, W. of Morwell, is continuous with that occurring along the axis of the Yallourn Monocline (cf. Edwards 1945). The present writer, in spite of careful search, has been unable to find any field evidence of the Haunted Hill Fault in the Jurassic or Tertiary sediments.

Within the area examined, the Haunted Hill Gravel and the coals and clays of the Latrobe Seam cross the line of the Haunted Hill Fault without any displacement. Outcrops of basalt, as well as levels on the basalt in bores, e.g. bores 18, 14, 457 and 459 Narracan, show that the basalt has not been displaced by the fault. Any movement on the fault, on this evidence, would have been pre-basaltic.

An unpublished map by Baragwanath (1917) shows a small triangular exposure of Jurassic sandstone faulted against the Siluro-Devonian sediments on what is now known as the Haunted Hill Fault, but which is referred to on the plan as a probable fault. Erosion has now exposed a much greater area of the Jurassic sandstone, which can be seen to be resting on the basal conglomerate which unconformably overlies the Siluro-Devonian basement. Moreover, bores on the Tanjil coal-field, immediately W. of the fault have recorded Jurassic sandstone at approximately the same level as these exposures.

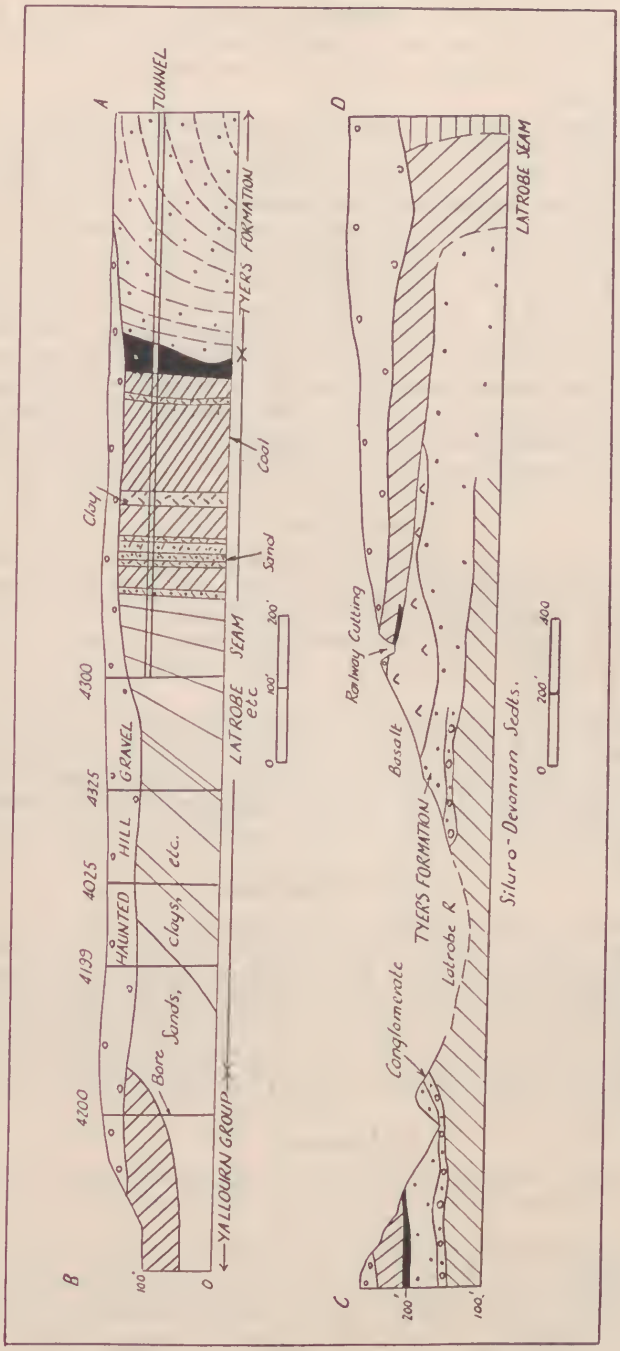

FIG. 3.—Geological sections. In section CD, the continuity of the coal between the railway cutting and the monocline has been inferred from a few isolated bores. Thin alluvium locally overlying the Hunted Hill Gravel is not shown on the sections.

Whitelaw's map of the Parish of Tanjil East shows the outcrops of the Siluro-Devonian sediments terminating to the W. along a line continuous with the Haunted Hill Fault. There is a marked drag on the fold axes, as well as shearing of the sediments adjacent to this line.

Brown coal and clay outcrop in the bed of the Latrobe R. close to steep cliffs of Siluro-Devonian sediments adjacent to the Fault. However, as already stated, the coal rests on Jurassic sandstone, and it can be shown that it would require a grade not steeper than 1 in 10 on the surface of the basement sediments to produce such a field relationship, with the coal unconformably overlying the basement. In view of the known steep irregularities on the surface of the Siluro-Devonian sediments, postulation of a fault to explain the relationship does not appear to be warranted.

The evidence of faulting of the Siluro-Devonian sediments is indisputable, with, using outcrop pattern as evidence, a strong W.-facing escarpment developed. Any movement which has occurred on the Haunted Hill Fault, however, predates the deposition of the Tyers Formation in Jurassic times. Similarly, no evidence of the Anderson Creek Fault described by Philip (1958) can be found in this area, and Philip's assertion that the fault forms the W. margin of the Tyers Formation appears to be too general, although the Anderson Creek Fault does locally form this boundary.

Conclusions

The detailed mapping in the Yallourn area has shown that the brown coal and associated sediments of the Yallourn Power Station and Tanjil Coal-field areas are correlatable with the Latrobe Seam. The Latrobe Seam and the overlying sands, clays, and thin brown coals, pass conformably up into the Yallourn Group, and therefore are to be considered, in part at least, to be the equivalent of the Morwell Group.

No evidence of any movement on the Haunted Hill Fault of age younger than pre-Jurassic has been found, and it is considered that the Yallourn Monocline, after swinging to the S., W. of Yallourn, is not terminated by the Haunted Hill Fault, but continues with a S. trend along the E. edge of the Haunted Hill. This monocline may thus be considered to form the W. limb of the E.-pitching Latrobe Syncline.

Acknowledgements

The writer gratefully acknowledges the assistance in the field of Messrs. R. L. Urie, A. Galimberti, and A. Sekas. The co-operation of Mr. N. J. Reynolds made possible the mapping of the foundations and tunnels. Professor E. S. Hills, Dr. A. B. Edwards, and Dr. O. P. Singleton read the manuscript and offered many helpful suggestions and criticisms. Encouragement and field assistance were given by my wife. The field work was carried out while the author was Geologist, Civil Engineer's Branch, State Electricity Commission. The paper has been published with the Commission's permission.

References

Baragwanath, W., 1917. Geological Map, Latrobe Gorge (Unpublished).

Edwards, A. B., 1945. Composition of Victorian brown coals. *Proc. Aust. Inst. Min. Met.* 140: 205-280.

Gloe, C. S., 1956. Geology of the Yallourn North extension area. *Geol. Rept. 1 S.E.C. Vict. Prod. Dept.* (Unpublished).

Herman, H. H., 1922. Brown coals of Victoria. *Bull. Geol. Surv. Vict.* 45: 5-135.

Philip, G. M., 1958. The Jurassic sediments of the Tyers group, Gippsland, Victoria. *Proc. Roy. Soc. Vict.* 70: 181-199.

Thomas, D. E., and Baragwanath, W., 1949. Geology of the brown coals of Victoria. *Min. Geol. Journ. Vict.* 3: 28-55.